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Advance Data Sheet
November 2000

P171-Type PIN/Preamp

The P171-Type PIN/Preamp features a rear-illuminated planar diode structure with low capacitance.

Features

- Low-profile, 4-lead mini-DIL package:
  — Suitable for SONET applications
- Optional differential output in a 6-lead mini-DIL package
- Transimpedance amplifier with automatic gain control (AGC)
- Metal package:
  — Offers superior shielding for high noise immunity
- High performance:
  — High speed (<0.5 ns typical rise and fall time)
  — High responsivity (0.85 A/W typical)
  — Low dark current
- Planar structure for high reliability
- Wavelength: 1.1 µm—1.6 µm
- 50 µm core multimode fiber
- Wide operating temperature range:
  — –40 °C to +85 °C
- Wide bandwidth
- Qualification program: *Telcordia Technologies** TA-NWT-983
- Typical sensitivity:
  — –38 dBm at 155 Mbits/s
  — –33 dBm at 622 Mbits/s

Applications

- Long-reach SONET OC-3/OC-12 and SDH STM-1/STM-4 telecommunications applications
- Secure digital data systems
- Line terminal equipment

Benefits

- Compact size
- Easily board mounted

* *Telcordia Technologies* is a registered trademark of Telcordia Technologies, Inc.

Description

The P171-type mini-DIL PIN/preamp consists of a PIN coupled to a multimode fiber pigtail and a wideband linear preamplifier. The PIN incorporated is a rear-illuminated planar diode structure with a low-capacitance active area for maximum responsivity and speed.

This device incorporates the new laser 2000 manufacturing process from the Optoelectronics Products unit of Agere Systems Inc. Laser 2000 is a low-cost platform that targets high-volume manufacturing and tight product distributions on all optical subassemblies. This platform incorporates an advanced optical design that is produced on highly automated production lines. The laser 2000 platform is qualified for central office and uncontrolled environments, and can be used for applications requiring high performance and low cost.

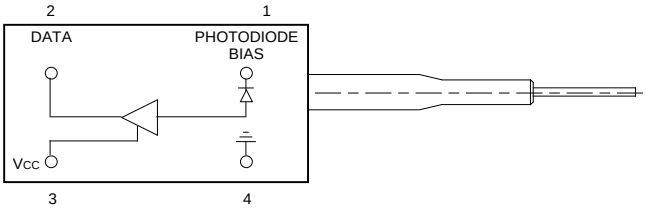


Figure 1. P171-Type R-PAK PIN/Preamp Schematic (Top View)

Table 1. Pin Descriptions

Pin Number	Description
1	Photodiode bias
2	DATA
3	VCC
4	Case ground

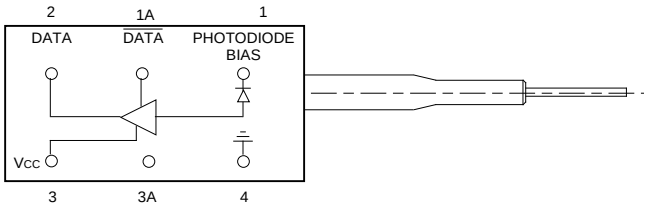


Figure 2. P171-Type R-PAK PIN/Preamp with Optional Differential Output Schematic (Top View)

Table 2. Pin Descriptions for Optional Differential Output Connection

Pin Number	Description
1	Photodiode bias
1A	$\overline{\text{DATA}}$
2	DATA
3	VCC
3A	NC
4	Case ground

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Min	Max	Unit
Operating Temperature Range	T_A	–40	85	°C
Storage Temperature Range	T_{stg}	–40	90	°C
Forward Voltage	V_F	—	0	V
Reverse Voltage*	V_R	—	30	V
V_{CC}	V_{CC}	0	6	V
Photocurrent	—	—	4	mA
Humidity	—	—	95	%

* The recommended reverse bias voltage is 5 V to 15 V.

Electrical Characteristics

T_C = 25 °C.

Table 3A. Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Dark Current	I_D	—	1	5	nA

Table 3B. Electrical Characteristics at 155 Mbits/s and 622 Mbits/s

Parameter	Symbol	155 Mbits/s			622 Mbits/s			Unit
		Min	Typ	Max	Min	Typ	Max	
V_{CC}	V_{CC}	4.5	5	5.5	3	3.3	3.6	V
V_{PIN}	V_{PIN}	3	5	15	3	5	15	V
Transimpedance (differential-ended output, 6-pin) Linear Range*	Z	200	—	260	4.5	6	7.5	kΩ
Transimpedance (single-ended output, 4-pin) Linear Range*	Z	45	—	80	—	—	—	kΩ

* Open circuit small signal gain. AGC activates beyond approximately –30 dBm.

Optical Characteristics

T_C = 25 °C.

Table 4A. Optical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Responsivity	R	0.75	0.85	—	A/W
Wavelength Range	λ	1.1	—	1.6	μm

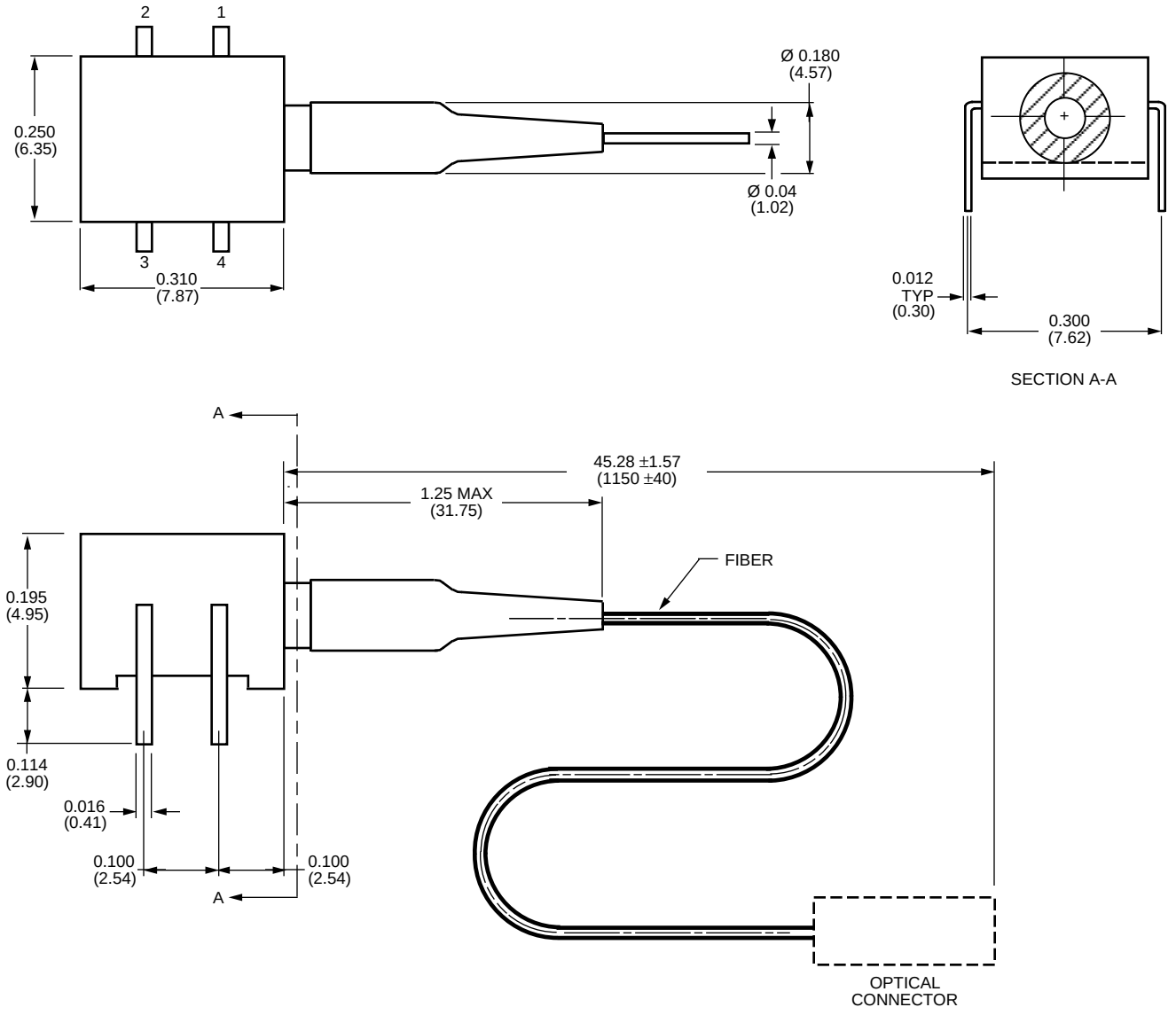
Table 4B. Optical Characteristics at 155 Mbits/s and 622 Mbits/s

Parameter	Symbol	155 Mbits/s			622 Mbits/s			Unit
		Min	Typ	Max	Min	Typ	Max	
Bandwidth	BW	110	150	—	460	590	700	MHz
Sensitivity	P_{LOW}	—	–38	–36	—	–33	–30	dBm
Overload	P_{HIGH}	0	0.5	—	–8	–6	—	dBm
Lower Cut-off Frequency	f_{CUTOFF}	—	—	10	—	—	150	kHz

Outline Diagrams

P171-Type PIN/Preamp—Standard Output

Dimensions are in inches and (millimeters).



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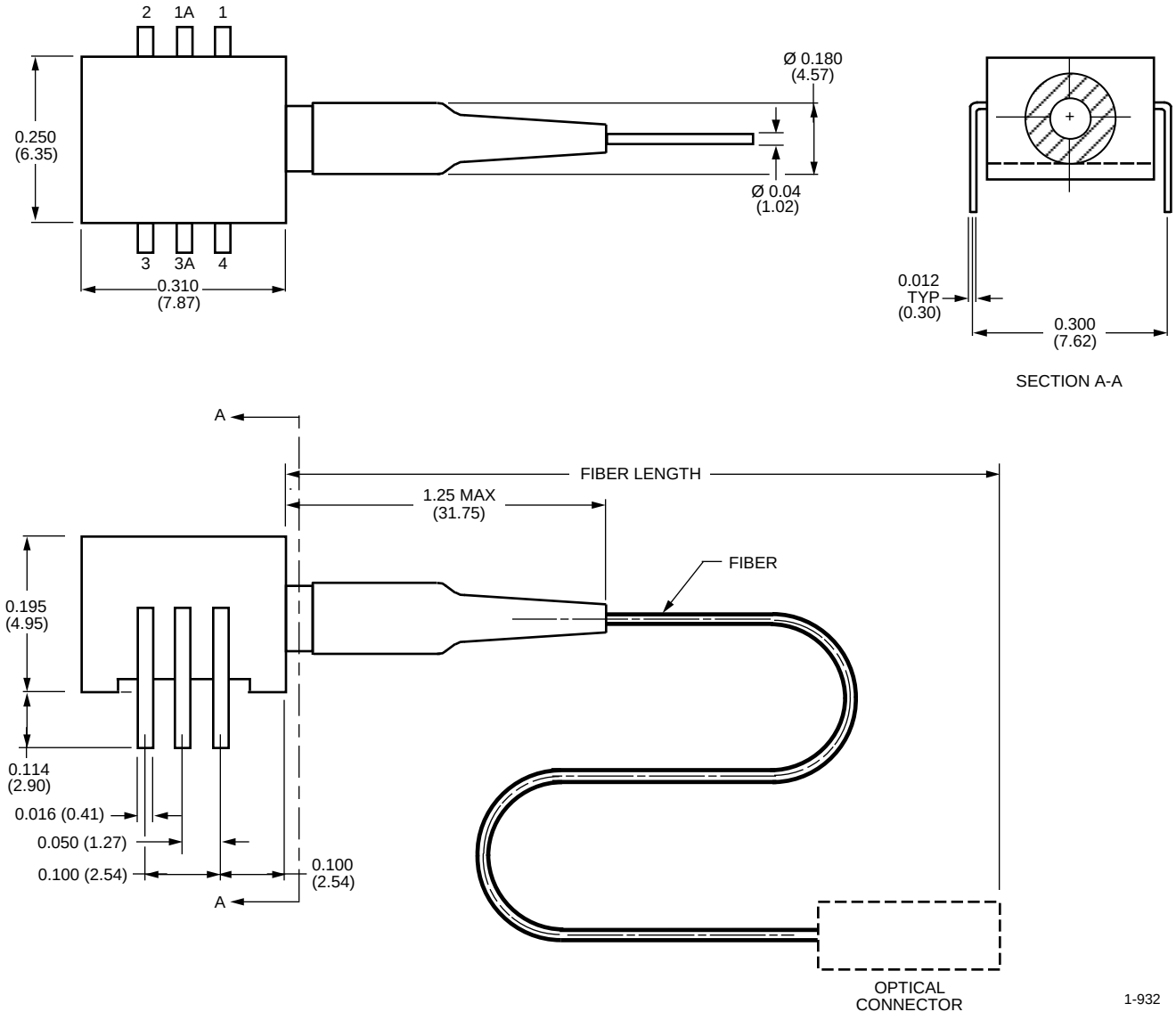
Outline Diagrams (continued)

P171-Type PIN/Preamp—Differential Output

Dimensions are in inches and (millimeters).



Qualification Information

The P171-type PIN/preamp is scheduled to complete the following qualification tests and meets the intent of *Telcordia Technologies* TR-NWT-000468 for interoffice environments and TA-NWT-000983 for outside plant environments.

Table 5. P171-Type PIN/Preamp Qualification Test Plan

Test	Conditions	Sample Size	Reference
Mechanical Shock	500 G	11	MIL-STD-883 Method 2002
Vibration	20 g, 20 Hz—2000 Hz	11	MIL-STD-883 Method 2007
Solderability	—	11	MIL-STD-883 Method 2007
Thermal Shock	ΔT = 100 °C	11	MIL-STD-883 Method 2003
Fiber Pull	1 kg; 3 times	11	*Telcordia Technologies* 983
Accelerated (biased) Aging	85 °C, 5000 hrs.	25	*Telcordia Technologies* 983 Section 5.18
High-temperature Storage	85 °C, 2000 hrs.	11	*Telcordia Technologies* 983
Temperature Cycling	500 cycles	11	*Telcordia Technologies* 983 Section 5.20
Cyclic Moisture Resistance	10 cycles	11	*Telcordia Technologies* 983 Section 5.23
Damp Heat	40 °C, 95% RH, 1344 hrs.	11	MIL-STD-202 Method 103
Internal Moisture	<5000 ppm water vapor	11	MIL-STD-883 Method 1018
Flammability	—	—	TR357 Section 4.4.2.5
ESD Threshold	—	6	*Telcordia Technologies* 983 Section 5.22

Ordering Information

Device Code	Description	Comcode
P171B014BAA	155 MHz Preamp, LR*, 4 Pins, 50 µm Fiber, SC	108156704
P171B014BAF	155 MHz Preamp, LR, 4 Pins, 50 µm Fiber, FC/PC	108156712
P171A016BAA	155 MHz Preamp, LR, 6 Pins, 50 µm Fiber, SC	108316373
P171A016BAF	155 MHz Preamp, LR, 6 Pins, 50 µm Fiber, FC/PC	108316381
P171B046BAA	622 MHz Preamp, >LR†, 6 Pins, 50 µm Fiber, SC	108695461
P171B046BAF	622 MHz Preamp, >LR, 6 Pins, 50 µm Fiber, FC/PC	108695479

* LR = meets SONET long-reach specifications.
† >LR = exceeds SONET long-reach specifications.

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